E 1.28:SOLAR/1025-79/03
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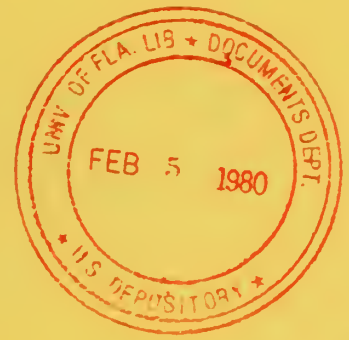

SOLAR/1025-79/03

Monthly Performance Report

HELIO THERMICS, INC. - LOT 6

MARCH 1979

U.S. Department of Energy

National Solar Heating and Cooling Demonstration Program

National Solar Data Program

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MONTHLY PERFORMANCE REPORT

HELIO-THERMICS, INC.
HOUSE LOT 6

MARCH 1979

I. SYSTEM DESCRIPTION

Helio-Thermics Inc., House Lot 6 is one of two instrumented single-family residences in Greenville, South Carolina. The home has approximately 1086 square feet of conditioned space. Solar energy is used for space heating the home and preheating domestic hot water (DHW). The solar energy system utilizes the attic space as the solar energy collector. The attic roof faces 10 degrees west of south and is pitched at an angle of 51 degrees from the horizontal. Solar energy enters the attic through a 416-square-foot aperture which is double-glazed with corrugated, translucent, fiberglass-reinforced, acrylic panels. The interior of the attic is painted black to maximize the absorption of solar energy. Warm air accumulates in the peak of the attic roof and circulates through the conditioned space or through storage by an air handler. Solar energy is stored in an 870-cubic-foot storage bin containing 85,460 pounds of crushed rock. The bin is located under the house and is insulated with 2-inch polystyrene insulation. Cold water is preheated in the attic by thermosiphoning water from the 80-gallon preheat tank through a manifold system of copper tubes. These tubes are attached to black sheet-metal plates, thus enhancing absorption of solar radiation for preheating the water as it circulates to and from the preheat tank. Preheated city water is stored in the preheat tank and supplied, on demand, to a conventional 80-gallon DHW tank. When solar energy is insufficient to satisfy the space heating load, a water-to-air heat exchanger in the hot air supply-duct provides auxiliary energy for space heating. A gas-fired water heater provides auxiliary energy for the water-to-air heat exchanger and DHW. The system, shown schematically in Figure 1, has seven modes of operation.

Mode 1 - Collector-to-Storage: This mode activates when there is no demand for space heating and the collector supply-duct temperature is 26°F higher than the storage temperature. This mode terminates when the temperature difference between the collector and storage is less than 16°F.

Mode 2 - Storage-to-Space Heating: This mode activates when space heating is required (but is not available from the collector) and the storage temperature exceeds the building ambient temperature by 5°F. This mode terminates when the building ambient temperature equals the storage temperature or when space heating is no longer required.

Mode 3 - Collector-to-Space Heating: This mode activates when space heating is required and the collector supply-duct air temperature is 10°F higher than the building ambient air temperature. This mode terminates when the temperature difference drops to less than 6°F or the space heating requirement is satisfied.

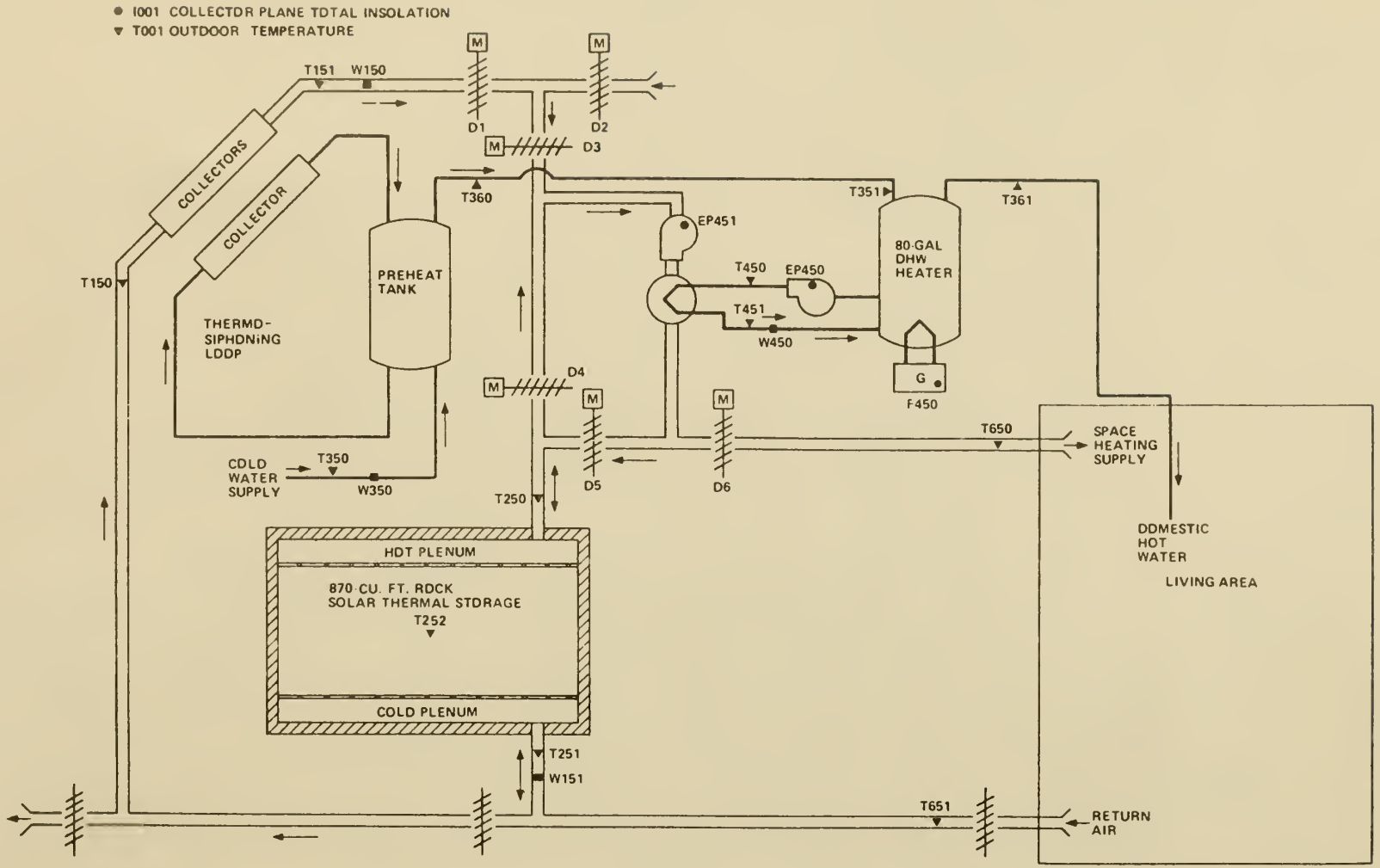

Figure 1. HELIO THERMICS, INC., LOT NO. 6, SOLAR ENERGY SYSTEM SCHEMATIC

Mode 4 - Auxiliary Energy-to-Space Heating: This mode activates when space heating is required and thermal energy is not available from the collectors or storage. An electrical heating element in the hot air supply-duct remains on until the space heating demand is satisfied.

Mode 5 - Summer Mode, Passive Cooling Storage: This mode can be activated when the residents wish to store cool air in storage for circulation the next day. The air-handler fan activates and an outside air-intake damper opens to allow the cool air to circulate through the attic and storage.

Mode 6 - Summer Mode, Space Cooling: This mode can be activated when cool air from storage is desired in the living area. The outside air-intake damper closes, the duct to the living area opens, and the air-handler fan activates.

Mode 7 - DHW Preheating: This mode activates when there is a demand for hot water. Water is drawn from the conventional DHW tank and replenished with heated water from the preheat tank. The DHW subsystem has this one independent mode of operation for preheating.

II. PERFORMANCE EVALUATION

INTRODUCTION

The site was occupied in March and the solar energy system operated continuously for 31 days during the month. Solar energy satisfied 75 percent of the space heating requirements. The solar energy system provided fossil fuel energy savings of 0.68 million Btu.

To prevent the possibility of water freezing in the thermosiphoning subsystem, this solar energy system component (located in the attic) has been drained until all danger of freezing has past.

WEATHER CONDITIONS

During the month, total incident solar energy on the collector array was 20.1 million Btu for a daily average of 1560 Btu per square foot. This was above the estimated average daily solar radiation for this geographical area during March of 1476 Btu per square foot for a south-facing plane with a tilt of 51 degrees to the horizontal. The average ambient temperature during March was 52°F a compared with the long-term average for March of 51°F. The number of heating degree-days for the month (based on a 65°F reference) was 394, as compared with the long-term average of 450.

THERMAL PERFORMANCE

Collector - The total incident solar radiation on the collector array for the month of March was 20.1 million Btu. During the period the collector loop

was operating the total insolation amounted to 16.3 million Btu. The total collected solar energy for the month of March was 4.1 million Btu, resulting in a collector array efficiency of 21 percent, based on total incident insolation. Solar energy delivered from the collector array to storage was 3.0 million Btu, while solar energy delivered from the collector array directly to the loads amounted to approximately 0.05 million Btu. Energy loss during transfer from the collector array to storage and loads was approximately 1.1 million Btu. This loss represented 27 percent of the energy collected. Operating energy required by the collector loop was 0.37 million Btu.

Storage - Solar energy delivered to storage was 3.0 million Btu. There were 0.36 million Btu delivered from storage to the space heating subsystems. Energy loss from storage was 2.4 million Btu. This loss represented 80 percent of the energy delivered to storage. This "lost" thermal energy is probably entering the living area and contributing to the lower-than-average space heating load. The predicted space heating load was 3.0 million Btu based upon actual ambient temperatures, considerably higher than the actual load of 0.55 million Btu. The storage efficiency was 20 percent: This is calculated as the ratio of the sum of the energy removed from storage and the change in stored energy, to the energy delivered to storage. The average storage temperature for the month was 82°F.

DHW Load - There was no solar energy contribution to the DHW load of 1.7 million Btu because the thermosiphoning subsystem had been drained. A daily average of 66 gallons of DHW was consumed at an average temperature of 155°F delivered from the tank.

Space Heating Load - The space heating subsystem consumed 0.41 million Btu of solar energy and at least 0.14 million Btu of auxiliary thermal energy (equivalent to 0.23 million Btu of auxiliary fossil fuel energy) to satisfy a space heating load of 0.55 million Btu. The solar fraction of this load was 75 percent. The space heating subsystem consumed a total of 0.22 million Btu of operating energy, to distribute both solar energy and auxiliary thermal energy.

OBSERVATIONS

The gas flow totalizer used to quantify the gas consumption is not providing valid data. The measurement of auxiliary thermal energy consumption in the DHW subsystem will not be available until this problem is corrected.

ENERGY SAVINGS

The solar energy system provided a total fossil fuel energy savings of 0.68 million Btu.

III. ACTION STATUS

Boeing will schedule a site visit in the near future to correct the erroneous gas totalizer data readings.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SITE SUMMARY

SITE: HELIOTHERMICS, INC. LOT 6, GREENVILLE, SC SOLAR/1025-79/03
REPORT PERIOD: MARCH,1979

SITE/SYSTEM DESCRIPTION:
THE HELIOTHERMICS SOLAR ENERGY SYSTEM PROVIDES SPACE HEATING AND DOMESTIC HOT WATER PREHEATING. IN THE SPACE HEATING SUBSYSTEM, THERMAL ENERGY IS TRANSFERRED BY AIR CIRCULATION FROM THE ATTIC TO THE LOAD OR TO CRUSHED ROCK IN AN INSULATED CONCRETE BIN. IN THE DOMESTIC HOT WATER SUBSYSTEM, SOLAR ENERGY IS COLLECTED FROM A 70 SQ. FT ALUMINUM AND COPPER PADDLE IN THE ATTIC AND TRANSFERRED TO AN 80 GAL. PREHEAT TANK BY THERMOSIPHONING. AUXILIARY ENERGY IS PROVIDED TO BOTH SUBSYSTEMS BY A COMMON NATURAL GAS WATER HEATER.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY	20.124	MILLION BTU
	48375	BTU/SQ.FT.
COLLECTED SOLAR ENERGY	4.147	MILLION BTU
	9970	BTU/SQ.FT.
AVERAGE AMBIENT TEMPERATURE	52	DEGREES F
AVERAGE BUILDING TEMPERATURE	72	DEGREES F
ECSS SOLAR CONVERSION EFFICIENCY	0.02	
ECSS OPERATING ENERGY	0.366	MILLION BTU
TOTAL SYSTEM OPERATING ENERGY	0.590	MILLION BTU
TOTAL ENERGY CONSUMED	*	MILLION BTU

SUBSYSTEM SUMMARY:

	HOT WATER	HEATING	COOLING	SYSTEM TOTAL	
LOAD	1.693	0.548	N.A.	2.241	MILLION BTU
SOLAR FRACTION	*	75	N.A.	*	PERCENT
SOLAR ENERGY USED	0.000	0.408	N.A.	0.408	MILLION BTU
OPERATING ENERGY	N.A.	0.224	N.A.	0.590	MILLION BTU
AUX. THERMAL ENERGY	*	0.140	N.A.	*	MILLION BTU
AUX. ELECTRIC FUEL	N.A.	N.A.	N.A.	N.A.	MILLION BTU
AUX. FOSSIL FUEL	*	0.233	N.A.	*	MILLION BTU
ELECTRICAL SAVINGS	N.A.	-0.156	N.A.	-0.522	MILLION BTU
FOSSIL SAVINGS	0.000	0.680	N.A.	0.680	MILLION BTU

SYSTEM PERFORMANCE FACTOR: *

* DENOTES UNAVAILABLE DATA
@ DENOTES NULL DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT OF THE NATIONAL SOLAR DATA PROGRAM,FEBRUARY 28,1978, SOLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SITE SUMMARY

SITE: HELIOTHERMICS, INC. LOT 6, GREENVILLE, SC
REPORT PERIOD: MARCH,1979

SOLAR/1025-79/03

SITE/SYSTEM DESCRIPTION:
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GENERAL SITE DATA:

INCIDENT SOLAR ENERGY	21.231	GIGA JOULES
	549347	KJ/SQ.M.
COLLECTED SOLAR ENERGY	4.375	GIGA JOULES
	113214	KJ/SQ.M.
AVERAGE AMBIENT TEMPERATURE	11	DEGREES C
AVERAGE BUILDING TEMPERATURE	22	DEGREES C
ECSS SOLAR CONVERSION EFFICIENCY	0.02	
ECSS OPERATING ENERGY	0.386	GIGA JOULES
TOTAL SYSTEM OPERATING ENERGY	0.622	GIGA JOULES
TOTAL ENERGY CONSUMED	*	GIGA JOULES

SUBSYSTEM SUMMARY:

	HOT WATER	HEATING	COOLING	SYSTEM TOTAL	
LOAD	1.787	0.578	N.A.	2.365	GIGA JOULES
SOLAR FRACTION	*	75	N.A.	*	PERCENT
SOLAR ENERGY USED	0.000	0.431	N.A.	0.431	GIGA JOULES
OPERATING ENERGY	N.A.	0.236	N.A.	0.622	GIGA JOULES
AUX. THERMAL ENG	*	0.147	N.A.	*	GIGA JOULES
AUX. ELECTRIC FUEL	N.A.	N.A.	N.A.	N.A.	GIGA JOULES
AUX. FOSSIL FUEL	*	0.246	N.A.	*	GIGA JOULES
ELECTRICAL SAVINGS	N.A.	-0.164	N.A.	-0.550	GIGA JOULES
FOSSIL SAVINGS	0.000	0.718	N.A.	0.718	GIGA JOULES

SYSTEM PERFORMANCE FACTOR: *

* DENOTES UNAVAILABLE DATA
0 DENOTES NULL DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT OF THE NATIONAL SOLAR DATA PROGRAM,FEBRUARY 28,1978, SOLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
ENERGY COLLECTION AND STORAGE SUBSYSTEM (ECSS)

SITE: HELIOTHERMICS, INC. LOT 6, GREENVILLE, SC SOLAR/1025-79/03
REPORT PERIOD: MARCH,1979

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	AMBIENT TEMP DEG-F	ENERGY TO LOADS MILLION BTU	AUX THERMAL TO ECSS MILLION BTU	ECSS OPERATING ENERGY MILLION BTU	ECSS ENERGY REJECTED MILLION BTU	ECSS SOLAR CONVERSION EFFICIENCY
1	0.332	46	0.023	N	0.007	N	0.070
2	0.671	51	0.014	O	0.013	O	0.020
3	0.092	54	0.007	T	0.000	T	0.073
4	0.062	62	0.006		0.000		0.091
5	0.804	61	0.002	A	0.014	A	0.003
6	0.760	49	0.009	P	0.014	P	0.012
7	0.803	48	0.027	P	0.014	P	0.033
8	0.603	48	0.011	L	0.013	L	0.018
9	0.919	48	0.032	I	0.017	I	0.035
10	0.409	51	0.008	C	0.008	C	0.019
11	0.995	44	0.032	A	0.014	A	0.032
12	0.982	44	0.035	B	0.016	B	0.035
13	0.830	52	0.017	L	0.016	L	0.020
14	0.651	56	0.002	E	0.011	E	0.003
15	0.966	43	0.024		0.016		0.025
16	0.947	40	0.027		0.016		0.029
17	0.926	46	0.025		0.015		0.027
18	0.819	56	0.000		0.017		0.000
19	0.776	60	0.000		0.016		0.000
20	0.749	66	0.000		0.017		0.000
21	0.295	61	0.000		0.005		0.000
22	0.375	58	0.000		0.007		0.000
23	0.109	56	0.000		0.000		0.000
24	0.518	49	0.015		0.005		0.029
25	0.545	39	0.038		0.004		0.069
26	0.956	40	0.028		0.014		0.030
27	0.613	52	0.021		0.015		0.034
28	0.835	55	0.005		0.017		0.006
29	0.610	60	0.000		0.013		0.000
30	0.583	63	0.000		0.016		0.000
31	0.986	66	0.000		0.014		0.000
SUM	20.124	-	0.405	N.A.	0.366	N.A.	-
AVG	0.649	52	0.013	N.A.	0.012	N.A.	0.020
NBS ID	C001	N113			C102		N111

* DENOTES UNAVAILABLE DATA.
& DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
COLLECTOR ARRAY PERFORMANCE

SITE: HELIOTHERMICS, INC. LOT 6, GREENVILLE, SC SOLAR/1025-79/03
REPORT PERIOD: MARCH,1979

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	OPERATIONAL INCIDENT ENERGY MILLION BTU	COLLECTED SOLAR ENERGY MILLION BTU	DAYTIME AMBIENT TEMP DEG F	COLLECTOR ARRAY EFFICIENCY
1	0.332	0.239	0.044	51	0.132
2	0.671	0.583	0.175	61	0.260
3	0.092	0.000	0.000	58	0.002
4	0.062	0.000	0.000	64	0.000
5	0.804	0.716	0.156	68	0.194
6	0.760	0.695	0.185	58	0.243
7	0.803	0.706	0.179	62	0.223
8	0.603	0.483	0.099	55	0.165
9	0.919	0.875	0.221	*	0.241
10	0.409	0.213	0.049	62	0.119
11	0.995	0.867	0.145	51	0.146
12	0.982	0.872	0.235	60	0.239
13	0.830	0.714	0.198	66	0.239
14	0.651	0.549	0.129	63	0.197
15	0.966	0.828	0.190	54	0.197
16	0.947	0.796	0.181	50	0.191
17	0.926	0.792	0.194	64	0.210
18	0.819	0.734	0.238	72	0.291
19	0.776	0.665	0.196	74	0.253
20	0.749	0.667	0.217	76	0.290
21	0.295	0.153	0.042	68	0.144
22	0.375	0.262	0.062	62	0.164
23	0.109	0.000	0.000	59	0.000
24	0.518	0.210	0.017	51	0.033
25	0.545	0.200	0.020	44	0.037
26	0.956	0.824	0.193	52	0.201
27	0.613	0.509	0.157	66	0.256
28	0.835	0.723	0.224	63	0.268
29	0.610	0.489	0.148	70	0.243
30	0.583	0.468	0.137	72	0.235
31	0.586	0.483	0.117	74	0.199
SUM	20.124	16.314	4.147	-	-
AVG	0.649	0.526	0.134	62	0.206
NBSID	Q001		Q100		N100

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
STORAGE PERFORMANCE

SITE: HELIOTHERMICS, INC. LOT 6, GREENVILLE, SC SOLAR/1025-79/03
REPORT PERIOD: MARCH,1979

DAY OF MONTH	ENERGY TO STORAGE MILLION BTU	ENERGY FROM STORAGE MILLION BTU	CHANGE IN STORED ENERGY MILLION BTU	STORAGE AVERAGE TEMP DEG F	STORAGE EFFICIENCY
1	0.038	0.023	-0.120	71	-2.571
2	0.128	0.013	0.067	68	0.632
3	0.000	0.007	-0.071	71	1.000
4	0.000	0.004	-0.050	67	1.000
5	0.122	-0.005	0.128	69	1.014
6	0.134	0.008	0.145	76	1.141
7	0.132	0.023	0.008	79	0.240
8	0.083	0.011	0.019	83	0.358
9	0.159	0.027	-0.002	81	0.160
10	0.040	0.008	-0.013	83	-0.121
11	0.105	0.025	-0.078	78	-0.502
12	0.162	0.032	0.074	77	0.656
13	0.145	0.017	0.101	84	0.816
14	0.057	0.002	0.002	88	0.042
15	0.141	0.024	-0.015	87	0.069
16	0.133	0.027	-0.013	86	0.107
17	0.140	0.025	0.008	86	0.242
18	0.168	0.000	0.114	91	0.680
19	0.142	0.000	0.053	96	0.373
20	0.155	0.000	0.025	98	0.164
21	0.030	0.000	-0.070	97	-2.295
22	0.044	0.000	-0.078	93	-1.778
23	0.000	0.000	-0.093	88	1.000
24	0.017	0.015	-0.105	83	-5.380
25	0.013	0.036	-0.160	73	-9.254
26	0.129	0.015	0.107	70	0.946
27	0.114	0.020	0.112	77	1.149
28	0.155	0.004	0.114	84	0.761
29	0.106	0.000	0.046	90	0.440
30	0.104	0.000	-0.011	91	-0.102
31	0.091	0.000	-0.002	91	-0.023
SUM	3.024	0.362	0.244	-	-
AVG	0.098	0.012	0.008	82	0.200
RES ID	0200	0201	0202		N108

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
HOT WATER SUBSYSTEM

SITE: HELIOTHERMICS, INC. LOT 6, GREENVILLE, SC
REPORT PERIOD: MARCH,1979

SOLAR/1025-79/03

DAY OF MON.	HOT WATER LOAD MILLION BTU	SOLAR FR.OF LOAD PER CENT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	SUP. WAT. TEMP DEG F	HOT WAT. TEMP DEG F	HOT WATER USED GAL
1	0.066	*	0.000	N	*	N	*	N	0.000	53	147	72
2	0.024	*	0.000	O	*	O	*	O	0.000	53	156	27
3	0.073	*	0.000	T	*	T	*	T	0.000	56	149	89
4	0.043	*	0.000		*		*		0.000	59	152	55
5	0.072	*	0.000	A	*	A	*	A	0.000	64	159	88
6	0.058	*	0.000	P	*	P	*	P	0.000	58	152	72
7	0.079	*	0.000	P	*	P	*	P	0.000	55	154	91
8	0.101	*	0.000	L	*	L	*	L	0.000	55	155	118
9	0.057	*	0.000	I	*	I	*	I	0.000	54	157	72
10	0.087	*	0.000	C	*	C	*	C	0.000	58	155	103
11	0.096	*	0.000	A	*	A	*	A	0.000	58	149	124
12	0.085	*	0.000	B	*	B	*	B	0.000	58	156	112
13	0.042	*	0.000	L	*	L	*	L	0.000	61	158	52
14	0.055	*	0.000	E	*	E	*	E	0.000	62	157	68
15	0.053	*	0.000		*		*		0.000	55	156	59
16	0.126	*	0.000		*		*		0.000	50	156	133
17	0.078	*	0.000		*		*		0.000	52	156	95
18	0.064	*	0.000		*		*		0.000	62	153	82
19	0.060	*	0.000		*		*		0.000	62	160	75
20	0.026	*	0.000		*		*		0.000	70	156	36
21	0.028	*	0.000		*		*		0.000	67	156	36
22	0.063	*	0.000		*		*		0.000	63	155	78
23	0.000	*	0.000		*		*		0.000	63	163	0
24	0.029	*	0.000		*		*		0.000	57	160	33
25	0.034	*	0.000		*		*		0.000	53	160	37
26	0.022	*	0.000		*		*		0.000	47	149	26
27	0.038	*	0.000		*		*		0.000	57	155	44
28	0.088	*	0.000		*		*		0.000	61	155	106
29	0.021	*	0.000		*		*		0.000	64	155	28
30	0.005	*	0.000		*		*		0.000	60	153	7
31	0.021	*	0.000		*		*		0.000	62	155	30
SUM	1.693	-	0.000	N.A.	*	N.A.	*	N.A.	0.000	-	-	2048
AVG	0.055	*	0.000	N.A.	*	N.A.	*	N.A.	0.000	58	155	66
NBS	Q302	N300	Q300	Q303	Q301	Q305	Q306	Q311	Q313	N305	N307	N308

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SPACE HEATING SUBSYSTEM

SITE: HELIOTHERMICS, INC. LOT 6, GREENVILLE, SC — SOLAR/1025-79/03
REPORT PERIOD: MARCH,1979

DAY OF MON.	SPACE HEATING LOAD MILLION BTU	SOLAR FR.OF LOAD PCT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	BLDG TEMP DEG. F	AMB TEMP DEG. F
1	0.023	100	0.023	0.013	0.000	N	0.000	-0.013	0.039	70	46
2	0.033	41	0.014	0.021	0.020	O	0.033	-0.017	0.023	71	51
3	0.011	60	0.007	0.004	0.004	T	0.007	-0.002	0.011	71	54
4	0.006	100	0.006	0.011	0.000		0.000	-0.011	0.009	72	62
5	0.002	100	0.002	0.001	0.000	A	0.000	-0.001	0.004	72	61
6	0.017	55	0.009	0.004	0.008	P	0.013	-0.003	0.016	71	49
7	0.027	98	0.027	0.005	0.001	P	0.001	0.004	0.044	71	48
8	0.011	97	0.011	0.004	0.000	L	0.001	-0.003	0.018	71	48
9	0.033	98	0.032	0.014	0.001	I	0.001	-0.013	0.053	72	48
10	0.008	98	0.008	0.003	0.000	C	0.000	0.021	0.013	72	51
11	0.037	88	0.032	0.016	0.005	A	0.008	-0.009	0.054	71	44
12	0.035	100	0.035	0.016	0.000	E	0.000	-0.016	0.058	71	44
13	0.023	74	0.017	0.005	0.006	L	0.010	-0.003	0.028	72	52
14	0.002	100	0.002	0.001	0.000	E	0.000	-0.001	0.003	73	56
15	0.024	100	0.024	0.007	0.000		0.000	-0.007	0.041	71	43
16	0.027	100	0.027	0.008	0.000		0.000	-0.008	0.046	71	40
17	0.025	100	0.025	0.007	0.000		0.000	-0.007	0.042	72	46
18	0.000	0	0.000	0.000	0.000		0.000	0.000	0.000	74	56
19	0.000	0	0.000	0.000	0.000		0.000	0.000	0.000	76	60
20	0.000	0	0.000	0.000	0.000		0.000	0.000	0.000	77	66
21	0.000	0	0.000	0.000	0.000		0.000	0.000	0.000	76	61
22	0.000	0	0.000	0.000	0.000		0.000	0.000	0.000	73	58
23	0.000	0	0.000	0.000	0.000		0.000	0.000	0.000	72	56
24	0.025	60	0.015	0.010	0.010		0.016	-0.007	0.025	69	49
25	0.065	58	0.038	0.042	0.027		0.046	-0.037	0.063	70	39
26	0.080	36	0.028	0.021	0.051		0.086	-0.013	0.047	68	40
27	0.021	100	0.021	0.007	0.000		0.000	-0.007	0.035	71	52
28	0.012	43	0.005	0.002	0.007		0.012	0.000	0.009	72	55
29	0.000	0	0.000	0.000	0.000		0.000	0.000	0.000	75	60
30	0.000	0	0.000	0.000	0.000		0.000	0.000	0.000	76	63
31	0.000	0	0.000	0.000	0.000		0.000	0.000	0.000	78	66
SUM	0.548	-	0.408	0.224	0.140	N.A.	0.233	-0.156	0.680	-	-
AVG	0.018	75	0.013	0.007	0.005	N.A.	0.008	-0.005	0.022	72	52
NBS	Q402	N400	Q400	Q403	Q401		Q410	Q415	Q417	N406	N113

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
ENVIRONMENTAL SUMMARY

SITE: HELIOTHERMICS, INC. LOT 6, GREENVILLE, SC
REPORT PERIOD: MARCH,1979

SOLAR/1025-79/03

DAY OF MONTH	TOTAL INSOLATION BTU/SQ.FT	DIFFUSE INSOLATION BTU/SQ.FT	AMBIENT TEMPERATURE DEG F	DAYTIME AMBIENT TEMP DEG F	RELATIVE HUMIDITY PERCENT	WIND DIRECTION DEGREES	WIND SPEED M.P.H.
1	797	N	46	51	N	N	N
2	1614	O	51	61	O	O	O
3	221	T	54	58	T	T	T
4	149		62	64			
5	1932	A	61	68	A	A	A
6	1828	P	49	58	P	P	P
7	1931	P	48	62	P	P	P
8	1450	L	48	55	L	L	L
9	2210	I	48	*	I	I	I
10	984	C	51	62	C	C	C
11	2393	A	44	51	A	A	A
12	2360	B	44	60	B	B	B
13	1996	L	52	66	L	L	L
14	1565	E	56	63	E	E	E
15	2323		43	54			
16	2278		40	50			
17	2227		46	64			
18	1969		56	72			
19	1864		60	74			
20	1801		66	76			
21	708		61	68			
22	901		58	62			
23	262		56	59			
24	1246		49	51			
25	1310		39	44			
26	2295		40	52			
27	1473		52	66			
28	2008		55	63			
29	1468		60	70			
30	1402		63	72			
31	1409		66	74			
SUM	48375	N.A.	-	-	-	-	-
AVG	1560	N.A.	52	62	N.A.	N.A.	N.A.
NBS ID	Q001		N113			N115	N114

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